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(54) Title: VAPOR DEPOSITED CATALYSTS AND THEIR USE IN FUEL CELLS

(57) Abstract: The invention provides a catalyst useful in a proton exchange membrane containing fuel cell for the electrooxidation of fuels prepared by the chemical activation of vapor deposited substantially semicrystalline PtXaAlb onto a substrate, wherein X is selected from the group consisting of Ru, Rh, Mo, W, V, Hf, Zr, Nb and Co, and a is at least 0.001, and b is at least 0.85•(1+a), with the proviso that when a=1 and b=8, X is only selected from the group consisting of W, V, Hf, Zr, Nb, and Co. These catalysts have an onset voltage for the electrooxidation of methanol of less than about 240 mV versus a saturated calomel electrode (SCE). They are useful in making diffusion backing electrodes and catalyst coated membranes for use in fuel cells.